Journal of Veterinary and Animal Sciences
DOI:https://doi.org/10.24843/JVAS.2017.v01.i02.p43
pISSN 2550-1283
August 2017 Vol. 1 No.2 : 43-46

Problems Detection in Urinary Tract of Dogs Using Ultrasound Method

I Putu Gede Yudhi Arjentinia[1*], Putu Ayu Sisyawati Putriningsih[1]

[1]Laboratory of Veterinary Internal Medicine,
Faculty of Veterinary Medicine, Udayana University,
Jl. P. B. Sudirman, Denpasar, Bali, Indonesia
Ph. (0361) 223791, Fax. (0361) 223791
*Corresponding author: yudhiarjentinia@unud.ac.id

Abstract. The aim of this study was to detect urinary tract problem in dogs using ultrasonography method as a diagnostic supporting tool. Two-dimensional ultrasonography was used for examination of 40 dogs. The diagnosis was confirmed by the alteration of shape, size, position and echogenicity of the renal. Abnormalities on renal were extension of medulla, urolithiasis, and renal atrophy. The extension of medulla was indicated by medulla and pelvis dilatation, also disappearance of renal parenchyma. Sonograms of renal urolithiasis were shown by hyperechoic mass with acoustic shadowing. Narrowing of medulla and disappearance of cortex structure were the characteristics of renal atrophy sonogram. Abnormalities in vesical urinary and urethra were cystitis, urolithiasis, and urethral urolith obstruction, respectively. Ultrasonography utilization as diagnostic supporting tool for the urinary organ abnormalities in dogs generating a high accuracy diagnosis.

Keywords: **diagnostic, dogs, ultrasonography, urinary tract.**

I. INTRODUCTION

Ultrasonography is the method of choice for imaging organs structure in small animals, where they are located in the abdominal and cannot be detected using radiography. Ultrasonography is a non-invasive method and does not require general anesthesia. Ultrasound is one of the modern diagnostic and highly beneficial aid in the diagnosis of renal diseases [7]. Both normal and abnormal can be seen, though this depends the quality of the equipment and operator skill [1].

Renal diseases are important clinical problems encountered in dogs and are frequent cause for illness and death [7]. Ultrasonography is widely applied to detect the abnormal structures and morphological changes in organ and is useful to narrow down the differential diagnosis [5]. Ultrasonography is also commonly use for detection of renal problems in the urinary tract [3]. Ultrasonographic evaluation is especially useful for assessing of renal, vesical urinary, and urethral anatomic information concerning the renal length, width, size of cortex and medulla.

Ultrasound-guided intervention procedures of ultrasound imaging enable to check renal problems such as subs-capsular fluid, renal dilatation, hydro-nephrosis, and ureteral dilatation [5]. Different abnormalities of the renal can be evaluated with ultrasonography, including of the size, shape, margins, echogenicity, structure and vascular flow patterns. The aim of this study was to elaborate on the usefulness of ultrasonography method for detecting renal problems in dogs.

II. MATERIALS AND METHODS

The ultrasound was performed on each dog without sedation or anesthesia. The dog was placed in dorsal and lateral recumbency for ultrasonography survey. Ultrasonographic examination was performed on healthy dogs suspected for renal disorders as well using Mindray model vet1200, with 4-7.5 MHz micro-convex transducer using the B-mode. A water-soluble gel was applied to the abdominal area to permit sound conduction. Sagittal scan position was started at the medial margin of the renal, such as long axis and short axis were scanned. The left renal was scanned through the ventral abdominal wall and the right renal was scanned around flank caudal in the middle of the last intercostals space. The vesical and urethral were scanned through by dorsal recumbency. The purpose of ultrasound investigation is to diagnose the size, shape, margins, contour and internal architecture including echogenicity and structure intensity of the renal.

III. RESULT

At the end of the abdominal ultrasound survey, we discovered the renal masses and enlargement of the renal. From the 40 dogs which showed urinary tract ultrasound changes. Ten dogs had renal problem, a hydro nephrosis was detected (Figure 1). A hydro nephrosis is shown by renal enlargement, enlargement of glomerulus and increased of the cortex size.

TABLE 1.
DISTRIBUTION OF DOG RENAL DISORDERS AS DIAGNOSED BY THE ULTRASONOGRAPHY METHOD

Types of Renal Disorders	Number of Dogs
Hydro-nephrosis	10
Urolithiasis	15
Chronic renal failure	2
Increase renal size	15
Renal Cysts	2

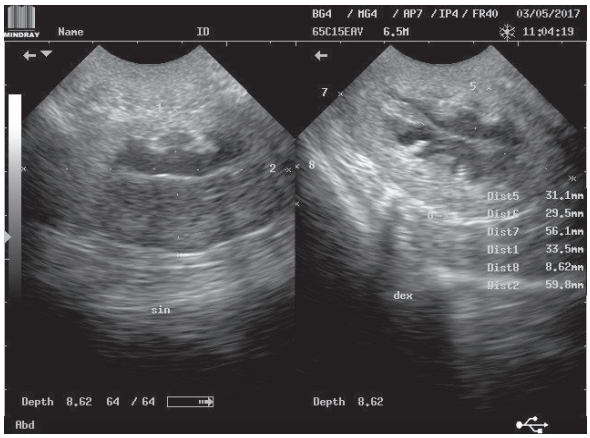

Fig. 1. Hydro-nephrosis were showed in dextra and sinistra renal

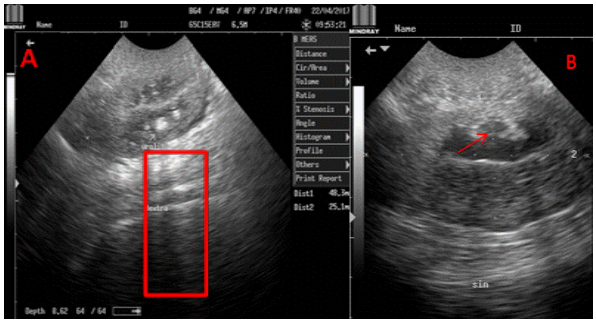

Fig. 2. (A) Lithiasis was showed with acoustic shadowing (in red box) in renal dextra and (B) renal mass

Fig. 3. An increase of the renal size (A) and decrease of the renal size (B)

Lithiasis was found in 15 dogs and the presence of renal masses was shown in two dogs as renal cysts (Fig. 2). Lithiasis can showed by hyperechoic image of mineral and urolith. The renal cyst showed by anechoic image, because the liquid showed decrease of echogenicity.

An increased of the renal size was showed in 15 dogs (Fig. 3A). There are two dogs with the chronic renal failure which characterized by a change in the echo-structure with a decrease in the renal size (Fig. 3B). The distribution of dog renal disorders according to the ultrasonographic method were shown in Table 1.

The sonogram results of vesical urinary in observation of dogs diagnosed with abnormalities in urinary system were: cystitis as many as eight dogs, urolithiasis in 15 dogs, and obstruction of the urethral in 12 dogs, respectively.

TABLE 2.
DISTRIBUTION OF VESICAL URINARY AND URETHRAL PROBLEMS IN DOG DIAGNOSED AS SHOWING ABNORMALITIES IN THE URINARY TRACT SYSTEM

Types of abnormalities	Number of Dogs
Cystitis	8
Urolithiasis	15
Urethral obstruction	12

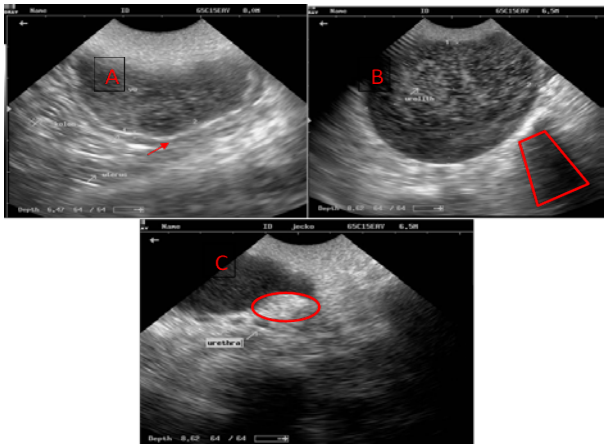

Fig. 4. Mucosal vesical abnormalities showed thickening of the mucosa (A) and urolithiasis indicate the presence of acoustic shadowing (B); urolith in urethral (C)

IV. DISCUSSION

The sensitivity and specificity of the ultrasound in evaluating the renal size were highly accurate. In diagnosing hydro-nephrosis, the imaging of ultrasound reveals marked dilatation or widening of the renal pelvic with echogenic pattern has been determined [6][7]. Of the 10 dogs which were diagnosed hydro-nephrosis: 4 dogs had bilateral dilatation of renal pelvic, 6 dogs showed enlargement of glomerulus, and 3 dogs showed increase of the cortex size, respectively.

Increased echogenicity of the renal can be seen associated with acoustic shadowing on mineralized material (e.g. calculi) [6]. Of the 40 dogs, 15 dogs were diagnosed urolithiasis in renal pelvic. Of the 15 dogs with urolithiasis, eight dogs showed acoustic shadowing in echogenicity imaging. Acoustic shadowing is characteristic in urolithiasis cases.

The renal cysts may be solitary or multiple. In this study, the renal cyst was characterized by the presence of echogenic or hypoechoic structure. The renal cyst showed anechoic image, because the liquid showed decrease echogenicity. The renal cystic in dogs, the clinical diagnosis reveals a mass without further details [6].

The chronic renal failure was characterized by the presence of decrease in the renal size. In this study, chronic renal failure was showed by increase hyper-echogenicity in cortex and medulla; and desperation of the limit between the cortex and medulla.

Thickening of urinary vesical mucosal can be caused by inflammation and neoplasia. Cystitis cases were characterized by thickening of the vesical mucosa even though full urinary vessels were filled with urine (Figure 4A). Thickening of the mucosal of vesical is an inflammatory response caused by bacteria, fungi, and parasites resulting from abrasion of crystals or extension and magnification of urolithiasis derived from the kidney [9]. Sonogram inflammation of the vesical is a hypoechoic area that is seen thoroughly.

The urolithic sonogram will be seen as a hyperechoic mass in the vesical. This mass can be seen as a very small mass or some showed as a hyperechoic mass. If the sonogram appears small particles or cellular debris, it will appear that the mass falls in accordance with the direction of gravity towards the base of the vesical urinary. The agitation and contraction of the urinary vesical causes the small mass to settle in the mucosa of the vesical. Sonograms do not always shows acoustic shadowing for urolithic cases in vesical. If the precipitate in the mucosa is thick enough and forms a large enough mass of uroliths, acoustic shadowing may appear below the urolithic (Figure 4B). Accuracy of urolithic examination of urinary vesical using ultrasound reaches 100% [2].

Continued urolithic events and the formation of a large enough mass of urolith may result in obstruction in the urethra especially in male dogs (Figure 4C). The anatomical form of male urinary tract is highly possible for obstruction by urolith. The urolithic sonogram of the urethra is a hyperechoic mass visible in the urethral.

V. CONCLUSION

Ultrasound is a very common and helpful diagnostic tool in small animal medicine [4]. The ultrasound is a modern, simple, non-invasive, and reliable tool. Ultrasound examination is important in diagnosing urinary tract problems. The interpretation of ultrasound results depending on training, experience, and skill of the examiner in order to minimize false diagnosis. Accuracy of urolithic examination of urinary vesical using ultrasound reaches 100%.

REFERENCES

[1] Barberet, V. and Saunders, J.H. (2010). Ultrasonographic examination of selected small structures in dogs and cats: thyroid glands, lymph nodes and adrenal glands. Vlaams Diergeneeskundig Tijdschrift 79.

[2] Biller, D.S., Kantrowitz, B., Partington, B., and Miyabayashi, T. (1990). Diagnostic ultrasound of the urinary bladder. J. Am. Anim. Hosp. Assoc. 26: 397.

[3] Mantis, P. (2008). Ultrasonography of the urinary and genital system of the dog and cat. Iranian Journal of Veterinary Surgery. www.IVSA.IR.

[4] Maria, E.K.J., Zebisch, K., Enders, F., Pees, M., and Willuhn, J. (2001). Diagnosis of liver disease in birds by radiography and ultrasonography: Under special consideration of ultrasound-guided liver biopsies. Seminars in Avian and Exotic Pet Medicine 10: 153-161.

[5] Park, I.C., Lee, H.S., Kim, J.T., Nam, S.J., Choi, R., Oh, K.S., Son, C.H., and Hyun, C. (2008). Ultrasonographic evaluation of renal dimension and resistive index in clinically healthy Korean domestic short-hair cats. J. of Vet. Sci. 9 (4): 415-419.

[6] Remichi, H., Rebouh, M., and Boubendir, N. (2014). Ultrasound report in the diagnosis of dog's renal pathology. J. of Anim. and Vet. Advances 13(19): 1131-1134.

[7] Ruchi T. and H. Mehta. 2010. Diagnosis of renal disorders in dogs using ultrasound technique. Intl. Science Journal Vol (2) No (2) December, (2010) 213-214.

[8] Osman F., Leutenegger, C., Golino, D., and Rowhani, A. (2007). Real-time RT-PCR (TaqMan®) assays for the detection of Grapevine Leafroll associated viruses 1–5 and 9. J. of Virological Methods 141: 22–29.

[9] West, G, editor. (1995). Black's Veterinary Dictionary. 18th Ed. London: A and C. Black Limited.